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Designing for what? Approaching necessary production and consumption for a circular economy

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Abstract: Circular economy (CE) is currently a 'hot topic' in design discourse. The focus of these discourses has centered on product design, which is a core aspect of material circularity. However, CE is more than products. This assumption is the base for a research question: what should be the intention in designing for a CE? The recognition of CE as a systemic transition opens up opportunities for other forms of design. These forms should contribute to societal goals concerning why and what is produced –more than the profit-making. We contend that a CE should not be approached from the perspective of the usual actors, reduced to business/industry and waste management. We propose instead to take discussions about the governance of production and consumption as the starting point. Finally, we demonstrate the opportunity to open the futuring of CE through participatory and discursive methods based on cycles of speculation and visioning.

Keywords: circular economy; governance; necessary production; design contributions

1. Introduction

Circular economy (CE) is currently a 'hot topic' in design discourse. CE has evolved from waste management to value retention strategies (Reike et al., 2018), representing multiple opportunities for diverse design contributions across several design sub-fields. For example, in preparation for forms of consumption that extend the lifetime of products (Selvefors et al., 2018; Selvefors et al., 2019), in product design strategies for business models (Bocken et al., 2016). Empirical studies have also looked at how design practitioners address and understand CE (Dokter et al., 2021) and the challenges faced in designing products for or with materials recovered from waste (Singh & Ordoñez, 2016). In addition, there is growing acknowledgment of the need for product design processes to achieve material circularity –for example, identifying design roles for specific business strategies (De los Rios et al., 2017).

In most accounts of CE, product design is regarded as the stage when circularity is defined. Therefore, extensive literature focuses on product strategies or principles to consider when designing for a CE, including categories of products and materials for different recovery and

maintenance strategies (maintaining the value of products and materials). This type of literature follows a tradition of design for sustainability that has evolved from eco-design to circular design, going from preparation for recycling to planning for product integrity for multiple use cycles and product service systems (den Hollander et al., 2017; McAloone & Pigosso, 2017).

Undeniably, product design is an essential aspect of material circularity (Aguiar et al., 2021), which is not only relevant to the business context (profit-oriented goals). For example, research about material circularity can be framed from people's motivation to repair or to keep products in use for longer (Ackermann et al., 2018; Terzioğlu, 2021). This thus suggests that the transition towards a CE covers more than products. Furthermore, it raises questions about underlying social relations, organization, and distribution of resources –in just or unjust manners "by design" (Berry et al., 2018).

Raworth (2017) stresses the need to consider biophysical –planetary– and social limits as an economic aspect to be translated to actual implementations, constraining production –a discussion featuring in CE debates against the current backdrop of prospected endless economic growth (Kirchherr, 2021; Bauwens 2021). Furthermore, from a socio-technical perspective, it makes sense to expand CE's basic notions to look at more than its technical implementation – moving forward to the kind of society it supports. Similarly, in design discourse, particularly in academia, a socio-technical perspective calls for the recognition that design forms more than products (Dilnot, 1982). If a CE is supposed to be a sustainable pathway, it requires a change of perspective, zooming out from products to people and systems (Ceschin & Gaziulusoy, 2016). Thus, design to advance a CE should focus on more than products –which is an aspect that could also contribute to the general discourse and practice of CE, integrating discussions about technologies and consumption (Schröder et al., 2019). The point is not to leave products outside the debate but to question what is produced and why (Genovese & Pansera, 2021), to contribute to making the discussion on material circularity and its social effects more fruitful.

The extent and scope of the effects of a CE are an aspect that is not widely discussed or understood. Questions concerning larger societal goals, institutions' roles, and responsibilities are usually lacking (Moreau et al.,2017). As a result, deliberation about CE is usually reduced to the negotiations by powerholding actors in the industrial and financial sectors, with the support of governmental platforms (Berry et al., 2018; Fratini, 2019). The transition towards a CE risks becoming an empty signifier –worst, a signifier of greenwashing– or an unrealizable panacea (Corvellec et al., 2021). In this context, an aspect such as product longevity is framed as a dilemma between competitiveness (profit-making advantages) and social wellbeing, and would impact how designers operate (Cooper, 2017).

In practice, CE becomes, in many cases, a buzzword, entailing multiple meanings –from recycling to reducing or reusing and sharing, from top-down and bottom-up (Henry et al., 2021). Moreover, the kind of CE supported by coalitions of actors reflects the practices and understandings of those actors (Ortega Alvarado et al., 2021). Therefore, any CE will be socially

constructed, but this does not mean that it will be opened up to society as a whole. Instead, those enacting CE projects will have the main influence on its outcome. As an alternative for the future, the CE discourse still lacks recognition of plural political and intellectual programs. Instead, it appears to be subsumed by technological solutions and incrementalism of mainstream eco-design (cf. Fry, 2003). In response to these missing aspects, this paper proposes a reformulation of what design should "design for" by considering that it opens the opportunity to make plural futures possible (Escobar, 2021).

Thinking about opening to plural futures can be a daunting task for designers because it implies the recognition that others have equal or similar capacities to imagine and convene solutions about their future. Here, the challenge is how to mix design expertise –for example, in reflecting in and on action (Schön, 1983)– without the normativity of neoliberal orders of design (Julier, 2013). Thus, a research question is: what should be the intention in designing for a CE? Alternatively, and referring to Julier's (2013) call, could designers use the design of a CE as part of design activism? This would imply including goals that seek more than the win-win scenarios of commercial actors. Although ideas about CE and design contributions are still ill-defined, this paper aims to present another way of framing these contributions.

The structure of this paper includes five sections—first, this introduction. The second section discusses futuring for a CE and reviews some literature about CE in design and other disciplines. The third section presents a proposal for an approach to address CE from concerns other than products. The fourth section presents the results of a test of this approach with participatory methods. Finally, the fifth section discusses some strengths and shortcomings of the approach concerning the CE and offers some conclusions for further research.

2. What to future in a circular economy

In the context of transformations for a CE, the studies of Dokter et al. (2021) and Dan and Østergaard (2021) suggest that design practitioners are becoming more aware of a need to work with others and act as connectors –within a context or a system. However, a shortcoming of these studies is that the design practice studied is only concerned with projects for productive sectors (e.g., architecture, manufacture, fashion). These studies evidence an integration of circularity as a component of design practice. However, it does not consider other possibilities for design contribution–for example, forms of design that do not conform to a commercial agenda (Tharp & Tharp, 2019)– not surprising in the business context. In this regard, Pedersen and Clausen (2019) move design contribution capacity a bit further by focusing on the co-design (or negotiation) for integrating CE through the concept of value chains in clothes washing services at hospitals. Although not open to the whole society, this last example uses design in its capacity to enact moments and objects that connect different participants in spaces for negotiation.

Van Dam et al. (2020) have reviewed some of the modes of design that can contribute to CE. Their study categorized design contribution opportunities in four: for circular production processes, for circular consumption, to support policy, and education for CE. The relevance

of this study is that it shows that CE in design research is looking at those four components, but usually from the understandings of the commercial agenda –with neoliberal features (cf. Julier, 2013).

Hobson (2021) has noted that CE implies a socio-material reconfiguration. Thus, it means that the form of design cannot only be focused on technical artifacts but instead on the re-configuration of both the use of materials and the social arrangements that structure the practices and logics through which those materials are used (Welch et al., 2017). Following on the questions posed by White (2020) about design futuring for just transitions, one can wonder what it would take to democratize CE and what it would mean for design politics to democratize a CE. These are questions that talk not only about the CE people want but also about the design we want and the political issues that come with it.

Lofthouse and Prendeville (2018; p.465) suggest reframing the positioning of design regard-ing CE. This reframing would begin from the user's role and move to more participatory de-sign approaches. In this perspective, design is seen as a form of radical humanism, which ne-cessitates including people's everyday life problems, guided by the question of *"for whom the CE might be conceived."* This reframing of the design position is closer to the focus on systems and people as proposed by Ceschin and Gaziulusoy (2016).

Reframing design for a CE will require thinking and doing differently (Dorst, 2015). Further-more, it requires looking beyond solutions and paying attention to the bigger picture, the networks, complexities, and dynamics resulting from the interaction between individual agencies and social structures –a long-standing divide of sociological research that design will not solve. A CE can be framed as a wicked problem of design (Buchanan, 1992). It deals with a series of issues that are primarily concerned with material objects. Still, the proposed objects will depend on understandings involving signs, actions, and thoughts external to the product. This task requires, without doubt, a systemic understanding –a kind of design ex-pertise to see the systemic consequences and interconnections of a CE (for more about de-signers as system thinkers, see Design Council–UK, 2021).

Although CE is referred to as a system, the system perspective usually considers only materi-als for production (manufacture efficiency) and waste streams in interactions to achieve some environmental indicators and revenue creation opportunities. However, the use of materials and energy is not the end goal of people. What is used for manufacture or wasted results from people's participation in social practices (Warde, 2005; Shove & Walker, 2014). Following a proposal to look at CE as a path to limit or reduce consumption (Ortega Alvarado & Pettersen, 2021), a reframing from design would require recognizing what people think they can do (and not) within a CE, in addition to their contextual situations.

People act according to what they think is possible, what they expect (Brown & Michael, 2003), and what is collectively imagined (Jasanoff, 2015). Likewise, people's understanding of what they can do and say conditions their participation in practice (Welch and Warde, 2016). These aspects may appear individual, but most are socio-material, referring to what is

collectively normalized and accepted. The normalization and acceptance –of certain forms of being and doing– becomes what is politically enabled or enforced. It is more than individual preferences, and it falls into matters of infrastructured conditions and governance.

Regarding governance, research on CE has focused on material flows and waste indicators. Futuring CE is driven by a rehearsal of technological innovation and financial ideas, which can be measured and presented as win-win scenarios. Thus, making it difficult to criticize the uncertainties of circularity, particularly the social effects that cannot be measured. However, quantitative indicators also have a central role in the imagination about CE. Products and indicators are discussed, because as Völker et al. (2020, p.116) note, "nobody would argue for less circularity." These leave out more fundamental discussions, such as the relations between actors in the civil society, industrial and retail sectors, and the government, and how these structure the linear economy.

We propose reframing CE discussions by focusing on consumption and governance. We do that to add to the questioning about what is produced and why (Genovese & Pansera, 2021). This shift also offers the opportunity for design to contribute to CE by taking on modes closer to activism (Julier, 2013), systemic thinking (Ceschin & Gaziulusoy, 2016), just transition (White, 2020), and radical humanism (Lofthouse & Prendeville, 2018). It represents a move from commercial agendas to more discursive approaches (Tharp & Tharp, 2019). More experimentation on reframing (Dorst, 2015) will be necessary to contribute to the debates and discussions about CE without falling into the traps of proposing new product re-design for the sake of mere production. In the following section, we present a formulation of a proposal to start working on a reframing of CE.

3. Futuring the governance of production and consumption

The approach proposed in this section draws on debates about the intrinsic goals of CE. These debates question CE's congruence or compatibility with other movements or political projects, such as degrowth, sufficiency, eco-modernism, green growth (Hobson & Lynch, 2016; D'Amato, 2021; Bauwens, 2021) –debates that can also be framed for product design as alternative technology criteria (Ralph, 2021). These debates present core dilemmas about production and consumption limits and the possibilities for their governance, which interact with concerns about freedom –individual agency vs. control– and technology –incrementalism vs. steady-states (Bauwens et al., 2020). Moreover, the governance of production and consumption is hidden by the techno-determinism of most CE proposals, particularly the ends that policies and projects in the private sector intend to enable or enforce.

The question about the governance of a CE and its intrinsic goals may result in specific programs bound to local or regional contexts (Sutcliffe & Ortega Alvarado, 2021). To integrate those political concerns that could influence the coming into being of a CE, we propose to use participatory methods –in line with previous calls (Lofthouse & Prendeville, 2018; Pedersen & Clausen, 2019). Instead of answering what products or services to design, the methods

used should help identify and evidence controversies and opportunities for the govern-ance/organization of circularity focusing on the social aspects that could influence the future (Monda, 2018). Thus, for us, this means working around what is understood as neces-sary/sufficient for production and consumption and the roles different actors would take (market actors, public sector, civil society).

In practice, CE takes many different meanings, and most people may be unaware of what it entails. Topically CE can be understood as an end or as means. In both cases, people's con-sumption and production are modified, whether it is in products or habits –that drive mate-rial resource consumption. Therefore, we assume that opening the future of CE by question-ing the concept's meaning could be unfruitful. The focus should be on the nexus of con-sumption and production and their future governance. Not to imagine futures, but to reveal the opportunities to co-construct them.

To formulate a formal proposal, we agree with Lofthouse and Prendeville's (2018) position about the need to reframe the CE. However, we contend that this reframing should not come from designers alone –nor a group of experts, or from actors in the usual sectors (manufacture, retail, and waste management). If a CE emerges, it should be based on the understandings of regular citizens –the logic of their everyday life and their political posi-tions.

3.1. An approach proposal

The ground for this proposal is the identification of expectations of citizens about the future of production and consumption. This workshop takes two perspectives from design. 1) Par-ticipatory design to include interested or affected people in co-producing the solutions re-lated to their everyday lives. 2) Futuring to evidence and stimulate present reflection about probable, desired, and possible outcomes. While identifying expectations is the core aspect of this proposal, the process suggested here is coupled with deliberation and visioning of plans (discussion).

We deploy our approach using workshops as spaces for discussing and integrating a diversity of meaning –to open up the futures of production and consumption. Workshops are sug-gested here for their facility of execution, however other participatory methods could also be applied. The main factor of our approach is the emphasis given to "necessary production" as the aspect to question. We focus on products and their social significance. To do so, we recur to expectations and deliberation in their broadest sense to partake in a futuring prac-tice that is both participatory and discursive (Tharp & Tharp, 2019; Hajer & Pelzer, 2018). Thus, we propose opening the futures of CE by not talking about CE but instead about the core aspects it intends to palliate. At the same time, promoting the transfer of design capa-bility to people –at least for identifying strategies to deal with dissenting and contradictory visions.

The workshop's exercises address expectations through speculation –reflection upon specific objects, situations, or scenarios. Deliberation is addressed through visioning techniques.

Both suppose two different forms of thinking that can be complemented. In speculation, the thinking process reflects present conditions (fears and hopes or positive and negative). Visioning is about the conscious planning for action or the declaration of a desired state of being. These two approaches can be applied in iterative cycles (Figure 1).
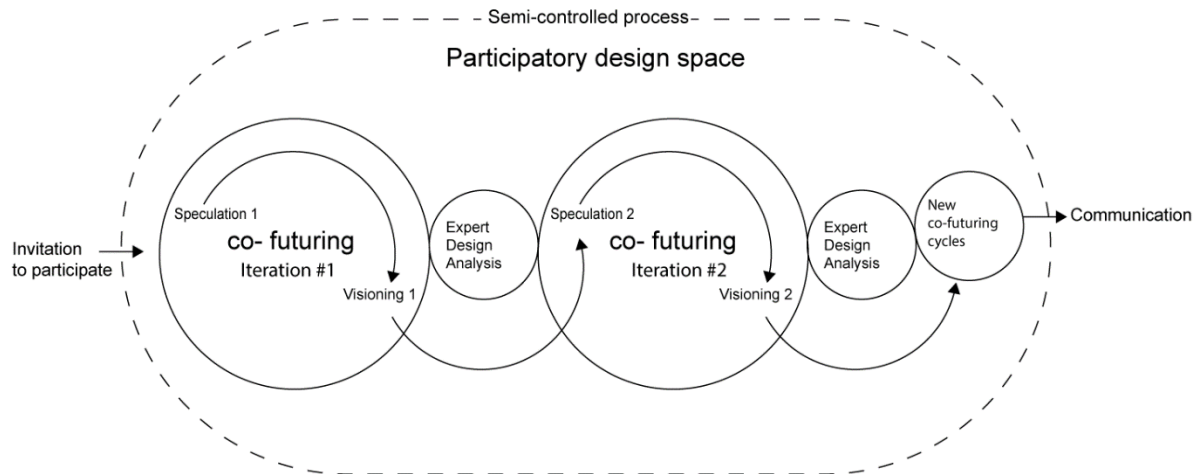

Figure 1. Diagram of the components of the proposed workshop

Each workshop comprises two activities, one of speculation and one of visioning, which offers the opportunity for reflection and deliberation. The use of speculation and visioning could be as open or closed as desired by the facilitators, which means flexibility of tools from normative visualizations and prototypes to more open-ended discussions. However, this proposal also considers a guided or semi-controlled participation, and it requires tools for the progression of the conversation around pre-defined topics. In this case, it means the involvement of materials (templates) to present ideas around specific generative questions that follow a planned script based on the debates mentioned at the start of this section –this mode of designing considers the interactions between expert and diffuse design (Manzini, 2015). The following chapter presents a run of the workshop with two iterations to test the assumptions made here about our approach.

4. A test of the workshop

Two workshop iterations were conducted at the end of September and October of 2021 with students at a public university in Norway (Figure 2). Six students from different study programs participated in the first workshop. Although the context of the workshop was Norway, the participants were all immigrants to the country. The second workshop had three participants; two were immigrants, and one was a native Norwegian. The workshops were conducted in a physical space, using English, and lasted around three hours (including a pause for food and refreshments).
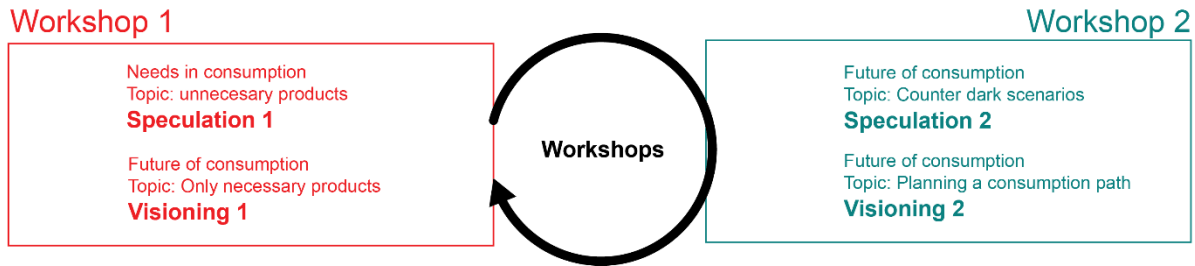
Figure 2. Topics covered in each workshop.

Before each event, a script and a presentation were prepared with generative questions and materials for speculation and visioning (Figure 3). In addition, large sheets of paper (templates) with titles and questions guided the pre-scripted narrative. These materials were the work of expert design.
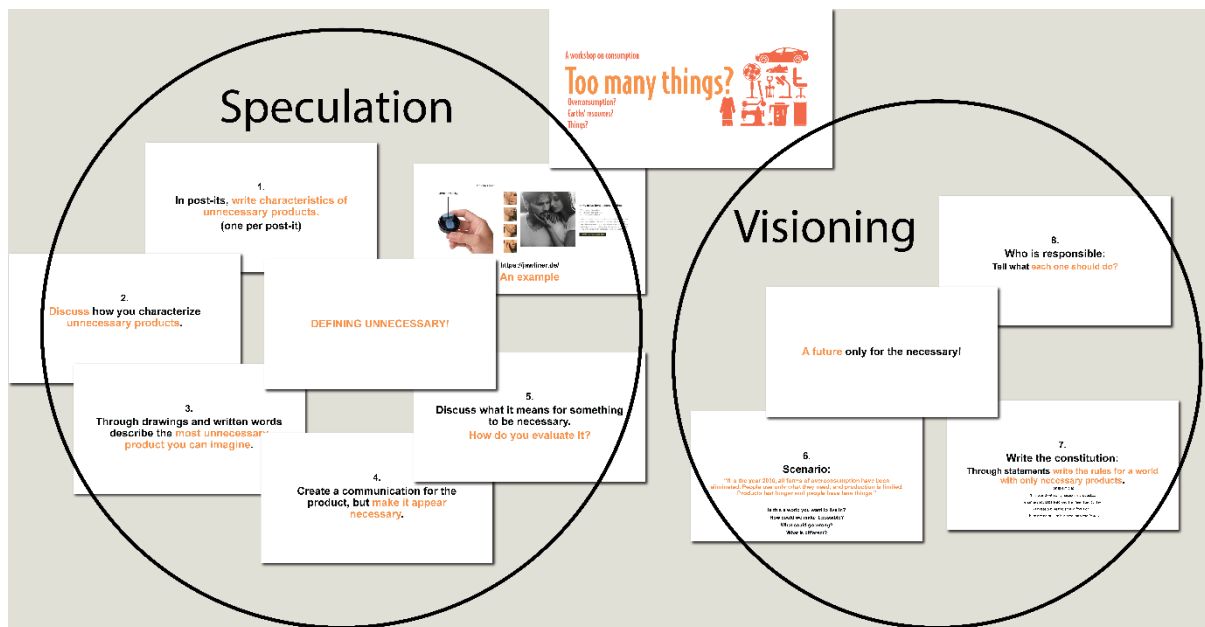

Figure 3. Example of scripted exercises for the first workshop.

4.1. The first workshop

In the first workshop, the participants were divided into pairs, resulting in three subgroups for discussion, and they had to complete eight exercises using seven templates (Figure 4). For the second workshop, three templates were used.
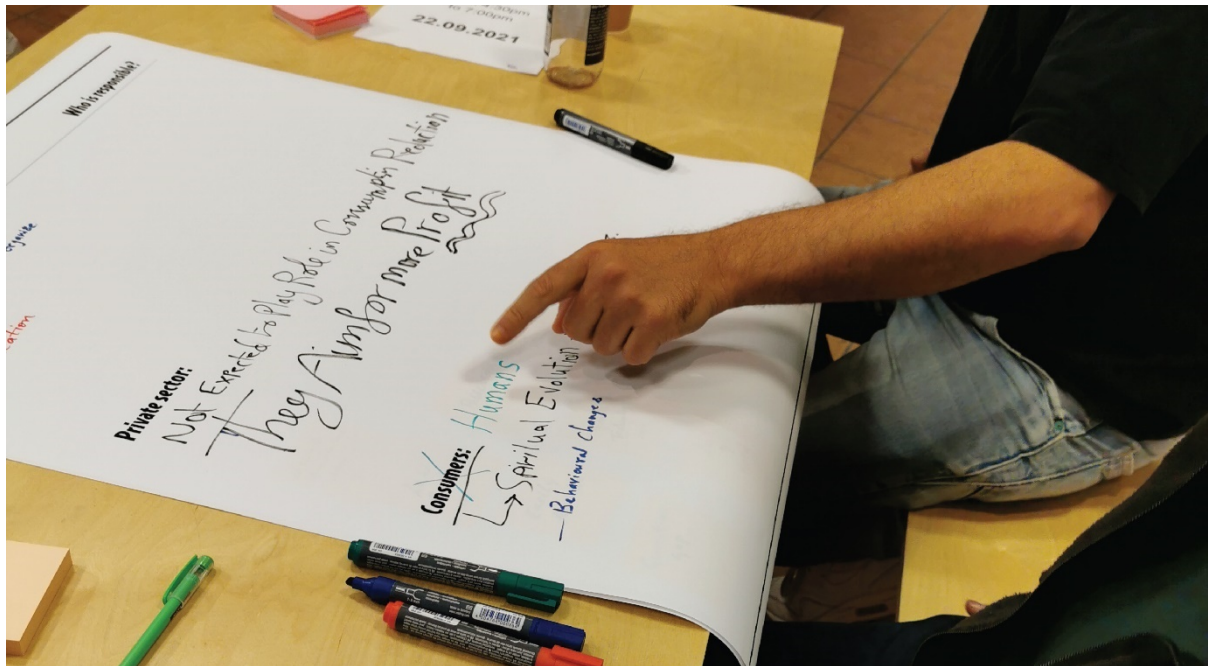
Figure 4. Picture of a participant in the first workshop.

The first workshop was oriented towards reflection and speculation about necessary and un-necessary production. The participants were given the task of defining examples and characteristics for products that they considered unnecessary, "the most unnecessary product they could mention." Then they had to come up with a way of presenting that product in a positive way to convince others to buy it. The following exercises included the definition of examples and characteristics of necessary products. After a pause, the participants went on to formulate scenarios for a world –in 2030– in which only necessary production is allowed. They were also requested to imagine the governance of that world. The final exercise was to define the responsibilities of different actors in the current system.

Speculation: defining unnecessary/necessary

The participants found it easier to point at examples of products that are unnecessary than pointing at characteristics. The three examples of unnecessary products given by the participants were: 1. The TV, as a product that becomes unnecessary under the current technological context. 2. Plastic packaging for fruits and vegetables, as a product that is an addition but contributes nothing –a debatable perception. 3. Any product with only one specific function (for example, egg slicer).

To further their reflection about how unnecessary products come to the market, the participants had to create a short communication about the example of unnecessary products. This exercise had the purpose of creating dissonance in the participants' reflections. Most of the participants took it as an opportunity to be satirical, for example, about the egg slicer: "*Be a perfect wife — get the slicer for beautiful egg slices.*"

The following exercise was about the definition of characteristics in the opposite spectrum, concerning what is necessary. During the discussions, the participants mentioned aspects related to culture, needs, satisfaction and education. Particular aspects about culture and context were related to products that are normative; for example, toilet paper, as put by one participant: *"I think toilet paper is quite unnecessary. You can have one of those water hoses or a shower."*

Visioning: a world with only necessary production

Besides discussing and reflecting around necessary or unnecessary products, the participants had the opportunity to put forward their perspective about the transition towards future governance of consumption and production. These included three tasks: saying what changes, mentioning a set of rules (policies), and indicating specific actors' responsibilities.
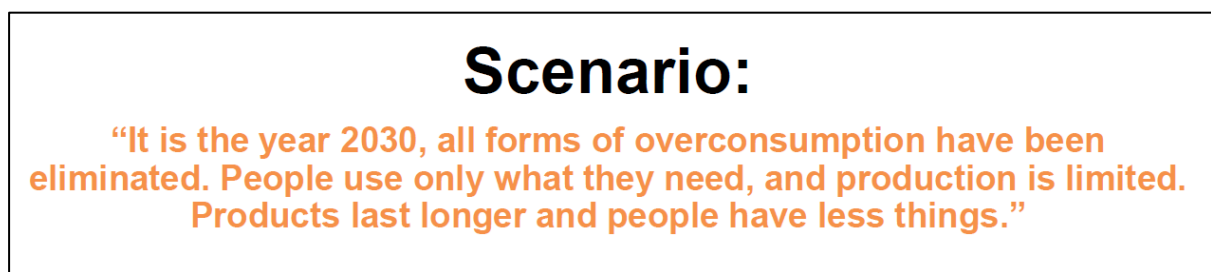
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Scenario:

"It is the year 2030, all forms of overconsumption have been eliminated. People use only what they need, and production is limited. Products last longer and people have less things."

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Figure 5. The scenario used in the first workshop.

For the first task, the participants were given a short scenario (Figure 5). Then, regarding what must change –to reach that scenario– the participants mentioned aspects related to the way of thinking of people. The participants pointed at education and the need to have mind shifts to avoid possible clashes with the governance. As one participant puts it:

> "We might think that there are so many things, and we get confused and bombarded with choices. There is analysis paralysis. So, it's not that things are making our lives miserable. We haven't learned how to derive utility from our miserable lives. And we have the frustration and can redirect it to opposing the government, if it imposes what's necessary, or whatever, for a party or group, it can lead to people clashing."

When it comes to the rules to govern production and consumption, there was a mixture of mentions about promotion through campaigns and incentives such as tax-cuts. This could mean in gross lines that the role of the government is understood as enabling more than enforcing actions. However, one group mentioned strict restrictions to producers (Figure 6), which means a more interventionist form of government or even an authoritarian one. This does not indicate that the two people in this group were pro-government to all their extent, but that there could be space to negotiate the role of the government in enforcing specific rules backed by regular people.
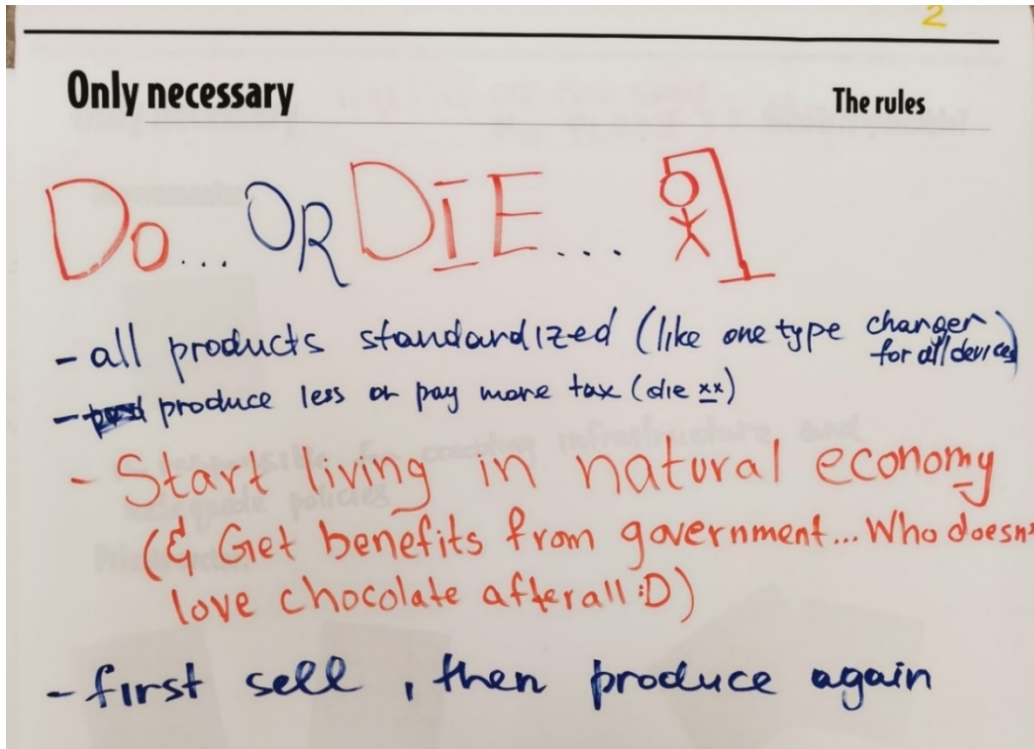
Figure 6. Rules indicated by one group of participants for a world with only necessary products.

Regarding responsibilities, a point was the role of the government in promoting change. For example, education and taxation were pointed out. However, there is also recognition about the need to change the role of the private sector, to focus on more than profit-making (Figure 7).
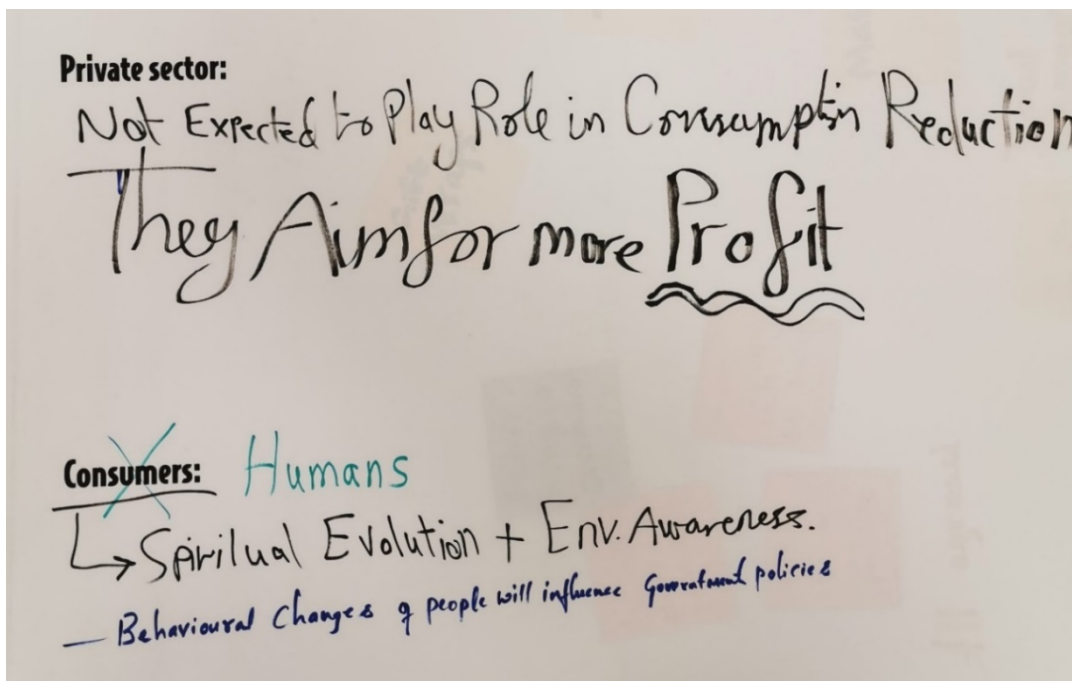

Figure 7. Example of responsibilities indicated by one of the groups.

4.2. The second workshop

As mentioned before, the second workshop was more self-contained because there were only three participants, and it was more of an in-depth discussion. With the materials from the first workshop we elaborated five fictional scenarios of Norway in the year 2030. These fictions were presented to the participants as text. Each text had a title coming from one of the concerns identified from the first workshop. However, the content of the scenario was about negative aspects under the question "What could go wrong?" (Table 1). These scenarios were the translation and curation of the concerns that emerged from the first workshop.

Table 1 Summary of concerns from workshop 1, the title of fictional scenarios, and examples of content.

Concerns from workshop 1	Incentives for low consumption (extended to production) (What kind of incentives?)
	Education for self-sufficiency
	(What is self- sufficiency?)
	Investment in research
	(What kind of knowledge to invest in?)
	Producers are given rules
	(How strict or flexible are these rules?)
	Markets are regulated
	(What kind of regulation will be accepted?)
	Encouragement for change
	(What is encouraged as change?)
	Self-sufficient production and consumption
	(To what extend should people be self-reliant?)
	Business reform
	(What more than profit?)
Title of the fictional scenarios	1) Encouragement of low consumption and production
	2) Education and skill transference for self-sufficient production and consumption
	3) Investment in research (self-sufficiency, materials and lifespan of products)
	4) Production and retail regulations
	5) Business reform (organization more than profit)
Examples of fictional content	"A mandate by the national government made sharing of products and material circulation a core service of all local governments from the year 2025."
	"Using or modifying materials from products registered by global brands is considered a breach of intellectual property under the business protection and repair assurance law of 2024."

Each participant read the scenarios and discussed them with the group. Each scenario was jointly discussed and classified into believable, possible, and wanted. The participants were also invited to declare what they found good and bad about each scenario and to select the best and worst ones (Figure 8 and Figure 9).

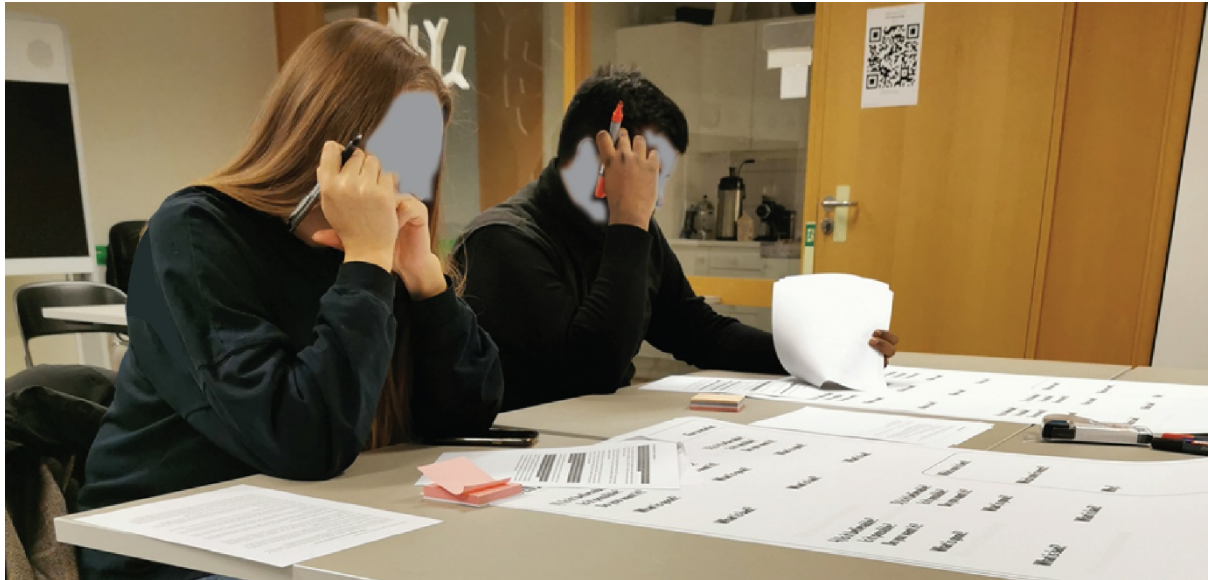*Figure 8. Template for the evaluation of the scenarios.*

Figure 9. Two participants of the second workshop while reading the scenarios.

After reading and evaluating the scenarios, the participants were invited to imagine a different or integrative scenario. This task proved helpful for two reasons: 1. The participants realized that limits have to be negotiated or imposed, and together defined the concept of "acceptable limitations." 2. The participants discussed about education and the role of freedom, which prompted a discussion about the participants political leaning, in friction with control over education (Figure 10).
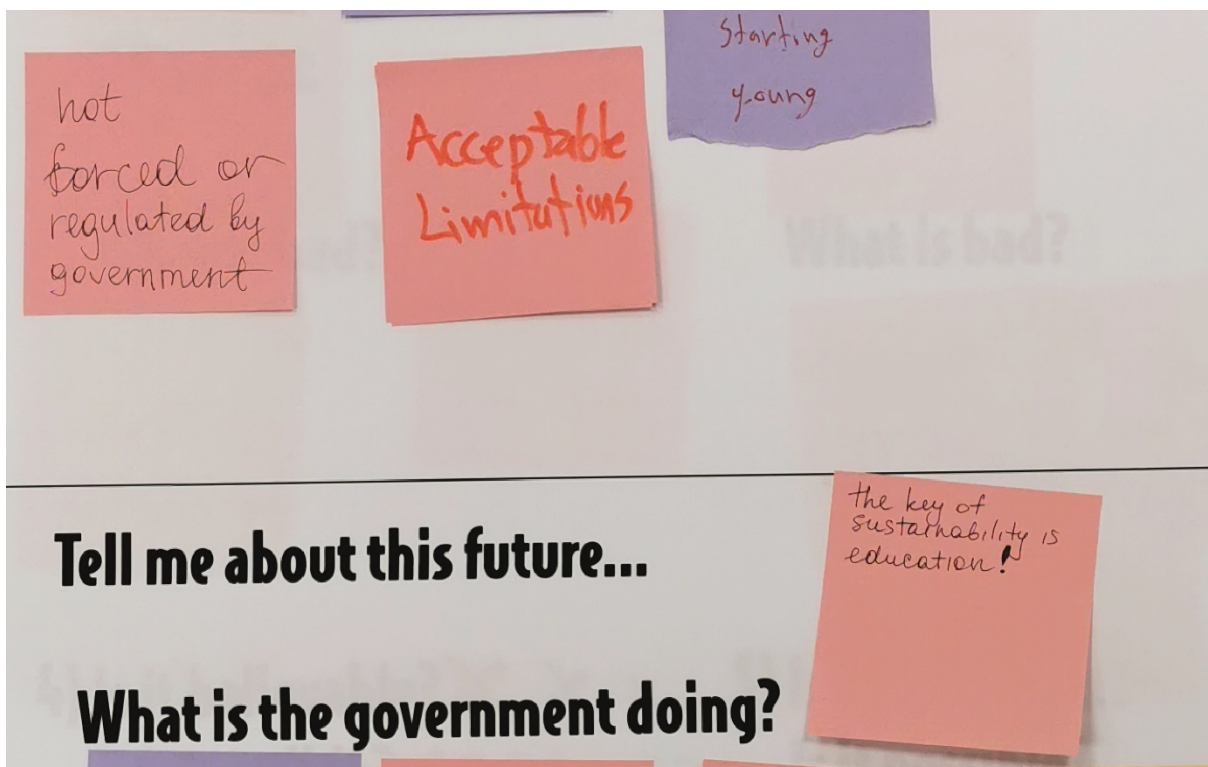

Figure 10.The participants indicated acceptable limitations and education as "key of sustainability."

The final task was about specific policies or ideas to make the changes in consumption happen; the participants found it easier to pose what they wanted than to talk about policies. It appears that although they understand the role of government, it is not something they take as their task to be propositional about, unless it comes from the place of individual wants (Figure 11).
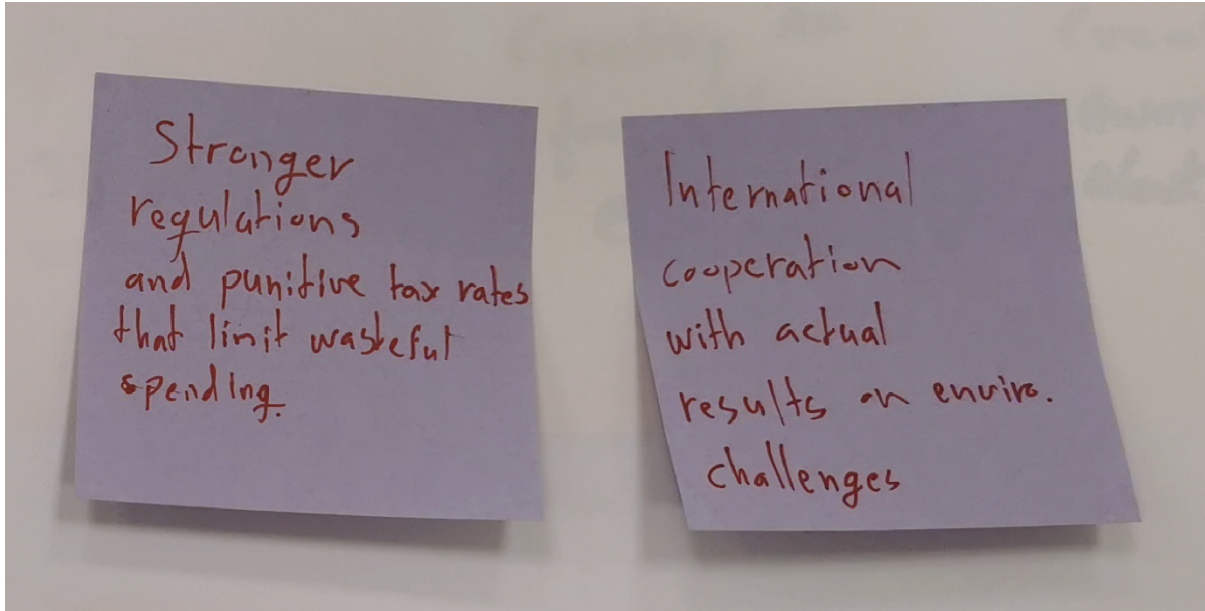

Figure 11. Example of wants declared by one participant.

The description of the workshops and the results presented here are not supposed to lead to conclusions about how people understand consumption and production and their governance, but instead to demonstrate that it is possible to open the future of CE from this position and through design modes that are not focused on defining products –which does not exclude talking or discussing about products. The following section presents a final discussion and conclusions.

5. Discussion and conclusion

In the introduction of this paper, we asked: what should be the intention in designing for a CE? We have approximated an answer through the review of literature in section 2, which allowed us to propose an approach to open up futures from discussions about the core aspects of CE without having to speak directly about CE. We then presented an example deploying this approach in two iterations of a workshop based on speculation and visioning through participatory methods. Thus, we posit that the intention in designing for a CE should be more than products and should be about opening it to the issues underlying consumption and production, those that are the motivations –why– and the socially acceptable productions –what.

These workshops allowed us to test some of our assumptions about the core aspects that could emerge from discussing consumption and production in relation to governance. This aspect is relevant to any CE because it says more about having one or another type of CE. While previous literature in design has focused on people as users of products and services and their capabilities to repair, there are still gaps in the notions people have about the roles of other actors, such as producers, retailers, and governments. What people have to say and understand about the role of different actors is also crucial to how a circular economy is structured. For example, if governments were to regulate the pace of production and innovation to stay within the planetary limits, would that gather the support of a larger population?

The issues that emerge in the discussions could be exploited depending on who is deploying the approach proposed. For example, it is a good tool to collect data for research, as it provides rich information from multiple actors and is presented together at once. Still, it could also be used by the public or private sector in their planning activities and by non-profit organizations in their discussions about sustainability. Other issues that emerged in the workshops, such as the political inclination of participants, could be better integrated with other methods, for example, by grouping people who are pro or against the state's intervention on matters of production and consumption; or by testing their assumptions through serious games which involve role playing.

Finally, by integrating participatory design methods with speculation and visioning, we demonstrate that the contribution of design to CE can be more than the definition of products. Here, we tested an approach to discursive design in the form of a workshop, but the possibilities for other forms of experimentation are open. Our main contention is that methods and interventions reframing CE from design should reflect on questions about the limits to production and consumption. The approach exemplified here works on CE without being normative or falling into the proposal of incremental solutions. This way of addressing CE will enable the expansion of both design and CE to be the socio-material reconfiguration that others have claimed. Future research about CE could take a similar approach by understanding that a CE will depend on the system (of consumption and production) from which it emerges.

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